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Harmonics and Short Circuit Analysis with Multiple DG Units

Shailesh Kumar[1], Abhishek Kumar[2], Prof. Jagdish Koli[3], Prof. Madhu Upadhyay[4]
Department of Electrical and Electronics Engineering[1,2,3,4]
NRI Institute of Information Science & Technology, Bhopal
sshandilya2017@gmail.com

Abstract: *This paper introduces a novel approach employing Particle Swarm Optimization (PSO) for the optimal allocation of Distributed Generators (DG) in distribution networks (DN). The primary objectives include reducing harmonics and conducting short circuit analysis, studying the impact of DG on enhancing the voltage profile and overall system reliability and minimizing both active and reactive power losses. The optimization process incorporates an objective function (OF) guiding load flow calculations for the DNMATLAB-DIgSILENT simulations performed on an IEEE 33 bus DN to assess the effects of DG. Investigations into harmonics and short circuits are conducted under both with-DG and without-DG conditions, revealing noteworthy enhancements in system performance metrics, such as voltage profile and harmonics, validating the effectiveness of the proposed PSO-based method. In this study, PSO methods are deployed to address network challenges arising from installing multiple DGs of different types. Comparative analyses between PSO methodologies with and without DG underscore the improved outcomes of the proposed approach. Application of the suggested method to the IEEE 33 bus system demonstrates substantial reductions in harmonics, enhancements in voltage profile, and significant decreases in active and reactive power losses..*

Keywords: Particle Swarm Optimizer (PSO),Radial Distribution System (RDS), Optimal Power Flow (OPS), Distribution Network (DN), Distributed Generator (DG)

REFERENCES

[1]. H. Patel, A. Kumar, A. K. Bohre and O. Yadav, "Reliability-Based Performance Analysis of Distribution Network with Dispersed Generation Using Optimization," 2023 3rd International Conference on Energy, Power and Electrical Engineering (EPEE), Wuhan, China, 2023, pp. 982-988,
[2]. H. Patel, B. K. Saw, A. K. Bohre and O. Yadav, "Analyze the Impact of Distributed Generation Units on Distribution System Performances," 2023 IEEE International Conference on Power Electronics, Smart Grid, and Renewable Energy (PESGRE), Trivandrum, India, 2023, pp. 1-6,
[3]. S. Kansal, B. B. R. Sai, B. Tyagi, and V. Kumar, "Optimal placement of distributed generation in distribution networks," Int. J. Eng. Sci. Technol., vol. 3, no. 3, pp. 47–55, 2021.
[4]. EIA, "Modeling distributed generation in the buildings sectors," no. November, p. 7, 2019.
[5].M. Wang and J. Zhong, "A novel method for distributed generation and capacitor optimal placement considering voltage profiles," in IEEE Power and Energy Society General Meeting, 2011.
[6]. M. M. Aman, G. B. Jasmon, A. H. A. Bakar, and H. Mokhlis, "Optimum network reconfiguration based on maximization of system loadability using continuation power flow theorem," Int. J. Electr. Power Energy Syst., vol. 54, pp. 123–133, 2014.
[7]. T. T. Nguyen and A. V. Truong, "Distribution network reconfiguration for power loss minimization and voltage profile improvement using cuckoo search algorithm," Int. J. Electr. Power Energy Syst., vol. 68, pp. 233–242, 2015.
[8]. K. Sathish Kumar and T. Jayabarathi, "Power system reconfiguration and loss minimization for an distribution systems using bacterial foraging optimization algorithm," Int. J. Electr. Power Energy Syst., vol. 36, no. 1, pp. 13–17, 2012.

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[9]. J. S. Savier and D. Das, "Impact of network reconfiguration on loss allocation of radial distribution systems," IEEE Trans. Power Deliv., vol. 22, no. 4, pp. 2473– 2480, 2007.
[10]. B. Venkatesh, S. Chandramohan, N. Kayalvizhi, and R. P. K. Devi, "OPTIMAL RECONFIGURATION OF RADIAL DISTRIBUION SYSTEM USING ARTIFICIAL INTELLIGENCE METHODS," 2009.
[11]. M. Assadian, M. M. Farsangi, and H. Nezamabadi-pour, "Optimal Reconfiguration of Distribution System by PSO and GA using graph theory," pp. 71 83–88, 2007.
[12]. M. Sedighizadeh, M. Dakhem, M. Sarvi, and H. H. Kordkheili, "Optimal reconfiguration and capacitor placement for power loss reduction of distribution system using improved binary particle swarm optimization," Int. J. Energy Environ. Eng., vol. 5, no. 1, pp. 1–11, 2014.
[13]. F. V. Gomes et al., "Approach Using Optimum Power Flow and Sensitivity Analysis for Loss Reduction," vol. 21, no. 4, pp. 1616–1623, 2006.
[14]. J. C. Cebrian and N. Kagan, "Reconfiguration of distribution networks to minimize loss and disruption costs using genetic algorithms," Electr. Power Syst. Res., vol. 80, no. 1, pp. 53–62, 2010.
[15]. R. A. Jabr, R. Singh, and B. C. Pal, "Minimum loss network reconfiguration using mixed-integer convex programming," IEEE Trans. Power Syst., vol. 27, no. 2, pp. 1106–1115, 2012.
[16]. S. Elsaiah and J. Mitra, "A method for minimum loss reconfiguration of radial distribution systems," IEEE Power Energy Soc. Gen. Meet., vol. 2015– September, 2015.
[17]. S. A. Hussien and H. Mahmoud, "Optimal Placement and Sizing of DGs in Distribution System for Improving Voltage Profile and Reducing the Power Loss using Moth Flame Optimization Technique," vol. 6, no. 3, pp. 161–167, 2017.